REMARKS

The present response is to the Office Action mailed in the above-referenced case on April 27, 2005. Claims 1-21 are presented for examination. In the Action, claims 1-21 are rejected by the Examiner as being anticipated by Mizumoto et al. (6,393,299), hereinafter Mizumoto, in view of Pascoe et al. (4,245,355), hereinafter Pascoe

In response to the Examiners rejection and comments, applicant herein presents arguments which clearly distinguish applicant's claimed invention over that of the combined art provided by the Examiner.

Regarding claims 1, 5-8, 12-15 and 19-21, the Examiner states that Mizumoto discloses substantially all of the limitations of applicant's claims, including an on-chip voltage-controlled oscillator coupled to at least one of the circuit elements through one of frequency division circuitry for generating a local-oscillator signal to that circuit elements for conversion between that IF frequency and to receive or transmit frequency in the broadband spectrum. The Examiner admits however that Mizumoto does not specifically suggest that the converter is integrated on an IC, relying on the reference of Pascoe teach this deficiency.

However, applicant points out to the Examiner that applicant's claim 1 specifically recites "an on-chip voltage-controlled oscillator (VCO) coupled to at least one of the circuit elements through one of frequency multiplication or division circuitry for generating a local-oscillator (LO) signal to that circuit element for conversion between the IF frequency and the receive or transmit frequency in the broadband system". Applicant argues that although the reference of Mizumoto does appear to teach division circuitry for generating the LO signal, the reference clearly does not teach or suggest frequency multiplication circuitry as taught in applicant's specification and specifically recited in applicant's claim language.

The reference of Mizumoto teaches, with reference to Fig. 3, that signals in the two frequency bands received by the antenna (1) are divided in antenna duplexer (2), and the received signal in the band A is applied to the low-noise amplifier (31), while the received signal in the band B is applied to a low-noise amplifier (32). The amplified received signals in the bands A and B are both applied to a frequency converter EX1.

The frequency converter EX1 comprises first and second downconverters (41 and 42) as downconverters for use in reception system, first and second upconverters 161 and 162 as upconverters for use in transmission system, a frequency synthesizer 19, and a divide-by-N frequency divider (+N) 20 (col. 4, lines 5-18). The specification continues to describe in col. 4 further aspects pertaining to frequency division, not frequency multiplication, as in applicant's invention.

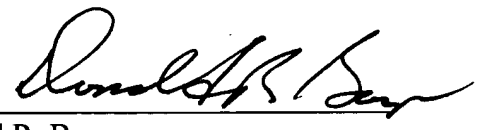
In contrast, applicant's invention teaches a system that reduces the number of limited-frequency voltage controlled oscillators (VCO's) needed to generate the required local oscillators signals to cover the wide range of frequency bands to be served. A method is described for synthesizing signals from such a broad range of frequencies, while minimizing the number of VCO's and circuitry needed to generate the required local oscillator signals.

Referring now to applicant's figure 1, which illustrates a system for broadband radio frequency upconversion and downconversion according to an embodiment of the invention, device 101, which is an example of a part of a transmit and receive system in a broadband application, utilizes new and novel practices for providing the LO signals required for synthesizing four separate signal bands, and achieves the required frequencies using fewer than four VCO's and achieves this wide frequency range utilizing frequency doubling and quadrupling (frequency multiplication), coupled with the practice of upper or lower sideband selection principles.

The up-conversion and down-conversion for outgoing and incoming signals is accomplished by circuits providing an electronic interface between each of the frequency bands 106, and the IF signals 124. A circuit 131 is provided for band 1 of the broadband spectrum, and circuits 132, 133, and 134 are for bands 2, 3, and 4 respectively. To achieve conversion of the separate bands in the broadband spectrum in this example to the intermediate frequency of 350 MHz, local oscillator (LO) signals in this embodiment are generated by only two on-chip VCOs, VCO 110 and VCO 112, each having the limited tuning range available from on-chip varactors of current technology. LO signals from VCOs 110 and 112 are provided via electronic connection to circuits 131-134, and in some cases by doubling or quadrupling to circuitry within device 101 enabling conversion to or from the intermediate frequency of 350 MHz.

Therefore, the claims standing for examination have been shown to be patentable over the art of record. Applicant respectfully requests reconsideration and that the present case be passed quickly to issue. If there are any time extensions due beyond any extension requested and paid with this amendment, such extensions are hereby requested. If there are any fees due beyond any fees paid with the present amendment, such fees are authorized to be deducted from deposit account 50-0534.

Respectfully Submitted,
Bert L. Fransis

by 
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